

General Information or Other (PAR)

Event # 44896

<b>Rep Org:</b> ABB INC.	<b>Notification Date / Time:</b> 03/11/2009 15:52 (EDT)
<b>Supplier:</b> ABB INC.	<b>Event Date / Time:</b> 03/11/2009 (EDT)
	<b>Last Modification:</b> 03/16/2009
<b>Region:</b> 1	<b>Docket #:</b>
<b>City:</b> Florence	<b>Agreement State:</b> Yes
<b>County:</b>	<b>License #:</b>
<b>State:</b> SC	
<b>NRC Notified by:</b> TERRY MALLOY	<b>Notifications:</b> ANTHONY DIMITRIADIS R1
<b>HQ Ops Officer:</b> DAN LIVERMORE	REBECCA NEASE R2
<b>Emergency Class:</b> NON EMERGENCY	JULIO LARA R3
<b>10 CFR Section:</b>	THOMAS FARNHOLTZ R4
21.21 UNSPECIFIED PARAGRAPH	RX PART 21 GROUP E-MAIL

## PART 21 NOTIFICATION - DEFECTIVE HK AND K-LINE CIRCUIT BREAKER TENSION SPRINGS

The identification of the subject component is as follows: ABB P/N 716359A00 Tension Spring. These springs are used in both HK (Medium Voltage) and K-Line (Low voltage) circuit breakers. In the HK breaker, the spring is used on the racking mechanism to position the racking mechanism interlocking latch. In the K-Line circuit breaker, the spring resets the prop latch mechanism following a circuit breaker trip. Circuit breakers and spare parts procured from ABB between 04/23/2008 and 02/27/2009 may have suspect springs installed.

Nature of the deviation: Micro-cracks in the base of the hooked end of the springs may result in failure of the springs after repetitive cycles. A broken spring could potentially affect the ability of a K-Line or HK breaker to reset and close after an opening operation. Initial report of the nonconformance was generated on 02/11/2009 (NCR #68999JL), reporting that springs failed during mechanical life testing being performed on a K-Line breaker. These springs failed after approximately 2,800 cycles each.

Given the large number of applications for the affected circuit breakers, ABB (Medium Voltage Service) cannot determine if the potential for a substantial safety hazard exists at any licensee's facility if a similar failure of the tension spring occurs. Licensees are requested to evaluate the history of inspections, maintenance practices, and circuit breaker operating cycles for K-Line breakers, and racking cycles for HK breakers to determine if the circuit breaker spring should be replaced immediately or at the next convenient maintenance opportunity. ABB recommends that any suspect spring with greater than 1,400 operating cycles be replaced as soon as possible.

Currently ABB is determining the affected licensees and will notify them on or about March 30, 2009.

\*\*\* UPDATE FROM K. WELBORN TO P. SNYDER AT 0759 ON 3/16/2009 \*\*\*

JE19  
NRK

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ABB updated the original report by providing a list of affected customers.

Notified R1DO (DeFrancisco), R2DO (Nease), R3DO (Lara), and R4DO (Farnholtz).

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March 13, 2009

Document Control Desk  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555-0001  
FAX 301-816-5151

Subject: Amended Report -- 10 C.F.R. Part 21 Notification of Deviation re. P/N 716539A00 Tension Springs

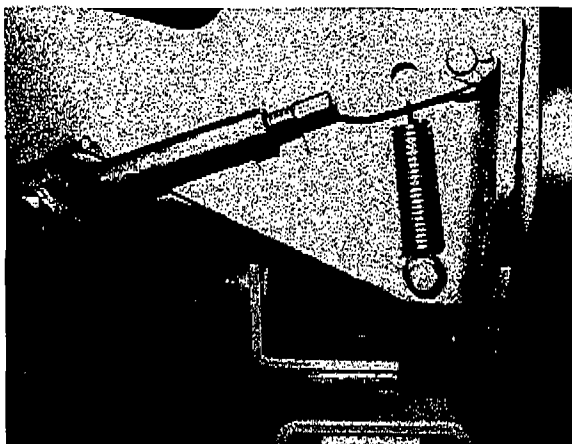
Dear Sir or Madam:

This amended report is submitted to provide the list of affected utilities who may have received a suspect component, report results of validation testing of replacement springs, and to correct a transposed part number of the subject component.

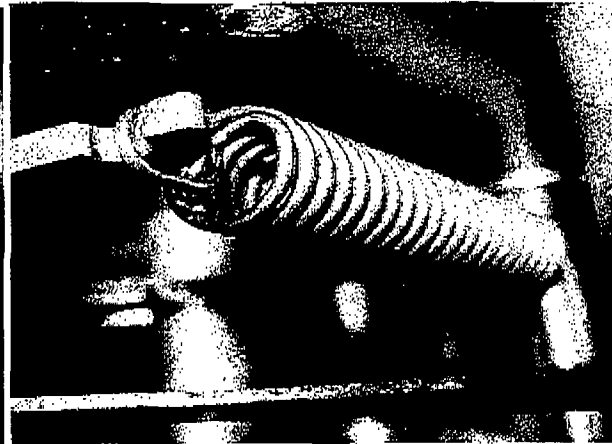
This letter is submitted in accordance with 10 C.F.R. § 21.21(d)(3)(ii) with respect to a failure to comply with specifications associated with P/N 716539A00 Tension Springs procured as a commercial grade item from Ace Wire Spring and Form, Inc., and dedicated by ABB from a Production run of 1215 pieces produced April 18, 2008. The information below is provided in order to meet the specific reporting requirements set forth in 10 C.F.R. § 21.21(d)(4).

The notifying individual is Mr. Kelly Welborn, Plant Manager, ABB Inc., 2300 Mechanicsville Road, Florence, SC 29501.

The identification of the Subject component is as follows: ABB P/N 716359A00 Tension Spring. These springs are used in both HK (Medium Voltage) and K-Line (Low Voltage) circuit breakers. In the HK breaker, the spring is used on the racking mechanism to position the racking mechanism interlock latch. In the K-Line circuit breaker, the spring resets the prop latch mechanism following a circuit breaker trip. See photos below:



HK Racking Mechanism Latch



K-Line Prop Latch Reset Arm

**ABB Inc.**

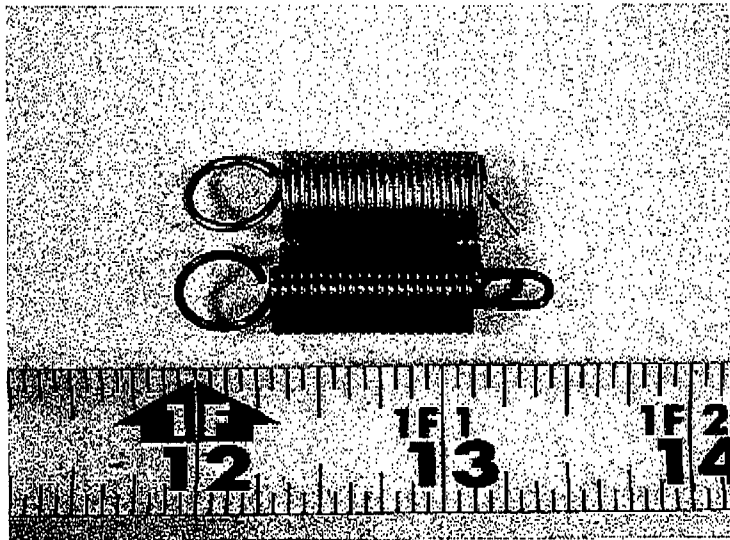
# ABB

Circuit breakers and spare parts procured from ABB between 4/23/2008 and 2/27/2009 may have suspect springs installed.

Nature of the deviation: Micro-cracks in the base of the hooked end of the springs may result in failure of the springs after repetitive cycles. A broken spring could potentially affect the ability of a K-Line or HK breaker to reset and close after an opening operation. Initial report of the nonconformance was generated 2/11/2009 (NCR #68999JL), reporting springs failed during mechanical life testing being performed on a K-Line Breaker. Three springs failed after approximately 2800 cycles each.

Metallurgical analysis of a failed spring concluded that the failure originated in pre-existing cracks in the bend area at the base of the fully formed round hook. Subsequent investigation at the vendor site determined that a production run in April 2008 was manufactured using a different method than prior production runs, in that the fully formed round end of the spring was made using a manual press instead of an automatic hydraulic/pneumatic press. The manual press forming cycle was significantly faster, in that the loop was formed in approximately one second, versus six seconds for the automatic press. Additionally, the manual forming operation was done after tempering and stress-relieving the spring, while the automatic forming occurred prior to tempering and stress relief.

An additional issue was identified during the investigation in that the opposite end rectangular hook had tool marks from the forming operation that could result in premature spring failure. One spring failed after 6000 cycles in the concave bend area at this end. See photo below:



## ABB Inc.



ABB is taking, or has taken, the following corrective actions:

- a. Promptly notify affected customers of the possibility of a failure of the springs as outlined. This action is expected to be completed on or about March 20, 2009. The list of affected utilities is included as Attachment 1 to this report.
- b. Reviewed historical procurement and inspection records associated with the subject part and vendor and determined that no previous defects were identified in the last five years, out of nearly nine thousand units received for both commercial and safety-related applications.
- c. Worked with our vendor, Ace Wire, to determine how future incidents can be prevented and developed quality assurance means to minimize the possibility of a recurrence. As of March 9, 2009, tooling has been polished to minimize tooling marks, and the fully formed hook will be made using the automatic forming machine on future orders.
- d. A cycle test has been completed to compare springs produced before and after Ace Wire polished the hook forming tools to validate that the corrective actions are sufficient. To date, 12,000 cycles on (20) springs have been completed, with no further failures. Microscopic inspection has also been done that confirmed the tooling marks have been reduced.

Given the large number of applications for the affected circuit breakers, ABB (Medium Voltage Service) cannot determine if the potential for a substantial safety hazard exists at any licensee's facility if a similar failure of the tension spring occurs. Licensees are requested to evaluate the history of inspections, maintenance practices, and circuit breaker operating cycles for K-Line breakers, and racking cycles for HK breakers to determine if the circuit breaker spring should be replaced immediately or at the next convenient maintenance opportunity. ABB recommends that any suspect spring with greater than 1400 operating cycles be replaced as soon as possible.

If you have any questions regarding this notice, please be so kind as to contact Mr. Kelly Welborn directly at 843-413-4777.

Sincerely Yours,

Kelly Welborn  
Plant Manager

Attachment – List of Affected Customers

**ABB Inc.**

List of Affected Customers

Customer	Address	CityStateZip	PO#
AMERICAN ELECTRIC POWER NUCLEAR GENERATION GROUP	500 CIRCLE DRIVE	BUCHANAN, MI 49107-1935	01530045, 01531073
APS PALO VERDE NUCLEAR GENERATING	PO BOX 52034	PHOENIX, AZ 85072-2034	500521364, 4500498099, 500527149
CONSTELLATION POWER SOURCE GENERATION, INC	PO BOX 17340	BALTIMORE, MD21297-1340	7709388
DOMINION RESOURCES SERVICES, INC	INNSBROOK TECHNICAL CENTER 5000 DOMINION BOULEVARD	GLEN ALLEN, VA 23060	45582792, 45602110, 45605512, 70164459, 70164459
DUKE ENERGY CAROLINAS LLC	MAIL CODE EC05P P. O. BOX 1006	CHARLOTTE, NC 28201-1006	00103937, 00104266, 00105219, 00105571, 00110451
DUKE ENERGY CAROLINAS LLC	MAIL CODE EC05N P. O. BOX 1006	CHARLOTTE, NC 28201-1006	00112742, 00114608
ENTERGY OPERATIONS - RIVER BEND	5485 US HIGHWAY 61	SAINT FRANCISVILLE, LA 70775	10183919, 10173757
ENTERGY OPERATIONS, INC	P.O. BOX 31995	JACKSON, MS 39286-1995	10199578
EXELON NUCLEAR COMPANY	P. O. BOX 160	KENNETT SQUARE, PA 19348	90 027099
FLORIDA POWER & LIGHT COMPANY	700 UNIVERSE BLVD P.O. BOX 14000	JUNO BEACH, FL33408	00112003, 00416044
FPL ENERGY, SEABROOK, LLC (FPLE)	P.O. BOX 300	SEABROOK, NH 03874	02215024, 02216456, 02216527
FPL TURKEY POINT NUCLEAR 36-4	10 MILES EAST OF U. S. ROUTE 1 ON PALM DRIVE	FLORIDA CITY, FL 33034	110016
FP&L ST. LUCIE ICM	700 UNIVERSE BLVD 1501 ARDMORE BLVD SUITE 401	JUNO BEACH, FL 33408 PITTSBURGH PA 15221	109705 4500094325
PERRY NUCLEAR POWER PLANT	10 CENTER ROAD	PERRY, OH 44091	45281324, 45281614, 45281882, 45286477, 45288472, 45291696, 45291572
PRAIRIE ISLAND NUCLEAR GENERATING STATION	1717 WAKONADE DRIVE, EAST	WELCH, MN 55089-9642	23558
PROGRESS ENERGY BRUNSWICK NUCLEAR PLANT	NC HY 87	SOUTHPORT, NORTH CAROLINA 28461	00328498, 00376675
PROGRESS ENERGY	CRYSTAL RIVER 3 NUCLEAR PLANT 15760 W POWER LINE STREET	CRYSTAL RIVER, FLORIDA 34428	403182
PSEG NUCLEAR, LLC	MAIL STOP S05 P. O. BOX 236	HANCOCKS BRIDGE, NJ 08038	4500443577, 4500453869, 4500458263, 4500465966, 4500479912, 4500490477
PSE&G	PO BOX 236	HANCOCKS BRIDGE, NJ 08038	4500461872, 4500464158, 449013, 4500498099, 4500499257
SOUTHERN CALIFORNIA EDISON	P. O. BOX 128	SAN CLEMENTE, CA 92674- 0128	6X2T8909, 6F222901 A015
SOUTHERN NUCLEAR OPERATING COMPANY	P. O. BOX 1295	BIRMINGHAM, AL 35201	7082861, 7079308/001, 7084838
STP NUCLEAR OPERATING COMPANY	PO BOX 289	WADSWORTH, TX 77483	106437
TVA NUCLEAR	1101 MARKET STREET	CHATTANOOGA, TN 37402- 2801	00057944-00202